Summary Report: 2016 Mississippi River Pool 8 Fall Walleye and Sauger Young-of-the-Year Assessment

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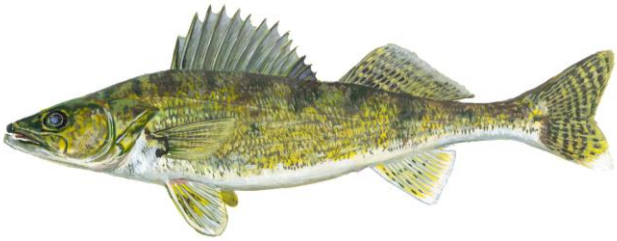


Objective: To determine pool 8 walleye and sauger young-of-the-year abundance using fall electrofishing.

INTRODUCTION

Walleye and sauger are highly sought-after recreational fish in the Upper Mississippi River. Both species provide fishing opportunities and a food source. Although angling success is generally good, it can vary based on natural population fluctuations. Some of these population fluctuations can be attributed to spawning success and early life stage survival.

A young-of-year fish (YOY) is defined as a fish less than 1 year old. Previous fish assessments have shown walleye and sauger YOY recruitment can vary significantly from year to year. These annual fluctuations appear to be due to biotic and abiotic factors during critical life stages and may determine year class strength.

Water temperatures during spawning and incubation are an important factor. Pitlo (2002) reported the rate of warming during these time periods was strongly related to YOY walleye and sauger abundance in the fall. The strongest year-classes were produced when water temperatures increased above 0.4 °F/day during April 15 and May 15 in Pool 13. Also, he found no correlation between the density of larval walleye in the spring drift and the density of YOY in the fall.

Pitlo (2002) also suggests larval drift could introduce large amounts of variation in year class strength per pool. For Pool 13, he theorized larval fish could have originated from several pools upstream or a mix of Pool 13 and upstream larvae. Holland (1985) also reported larval walleye drift in the Upper Mississippi River and Priegel (1970) reported that walleye fry drifted up to 73 river kilometers in 43 hours in the Wolf River.

Since 1968, there has been a continuous open angling season for both species, with an aggregate bag limit of 6 fish. Since 1990, there has been a minimum size limit of 15 inches for walleye. There is no size limit on sauger. This report primarily summarizes fall YOY survey results from Pool 8 in 2016 and compares them to results from previous years.

METHODS

In the 1980's, spatially fixed electrofishing index stations were established in the tailwaters of pools 5, 8 and 10 to assess fall YOY abundances. We sampled pools annually and concurrently after dark during late October or early November when water temperatures were below 10 ºC (50 ºF). Water temperature and secchi depth were recorded at each station. Water surface elevation and discharge from the dam were obtained from the U. S. Army Corps of Engineers St. Paul District. We sampled using a direct current electrofishing boat generating 140 to 530 volts at about 14 to 18 amps, pulsed at 80 cycles per second at a 20% duty cycle. The sampling crew consisted of one dipnetter and one boat operator. Each index station was electrofished with a single downstream timed run. The dipnetter attempted to collect all walleye and sauger less than 11 inches in total length. All fish were measured to the at least the nearest 0.1 inch and catch per hour (CPH) was determined for each station. The average CPH was calculated by dividing the total number of fish by the total time for all six stations combined. We also calculated catch per mile of shoreline.

The locations of the six sampling stations in the tailwater of Pool 8 are given in Figure 1. Sampling occurred on November 15, 2016. In 2016, we averaged 160 volts and 16 amps.

RESULTS

Relatively high water temperatures, discharges and surface water elevations could potentially have an effect on fish catch rates. During 2016, the mean water temperature was 9.4 ºC (49 ºF) which was 0.9 ºC (1.6 ºF) above the long-term average. Lock and Dam 7 tailwater elevation was 633.33 feet which was 0.63 feet above the long-term average. Discharge was 49,500 cubic feet per second which was 13,300 cubic feet per second above the long-term average. Through time, mean annual water temperatures have ranged from 5.7 to 13.1 ºC (42.3-55.6 ºF), and elevations varied from 631.0 feet to 635.8 feet. Discharge ranged from 7,500 to 60,000 cubic feet per second.

In 2016, all walleye and sauger less than or equal to 9.5 and 8.2 inches, respectively, were considered YOY. These maximum lengths were determined through examination of total length frequency distributions from this investigation and earlier fall 2016 non-YOY Pool 8 tailwater surveys. Within these length distributions, a midpoint of length within a frequency "trough" was chosen as the maximum size to define a YOY fish.

WALLEYE

Over the past 34 years, walleye have shown high annual variability in recruitment. Average walleye CPH has varied from 2.9 fish to 596.7. In 2016, walleye YOY CPH averaged 90.2 (Table 1). In 2016, CPH was lower than the long-term (1983-2016) average of 116.7, calculated from pooled data. Since 2008, eight of nine years have been below the long-term average. We have never measured such a high frequency of below average years since this survey began in 1983 (Figure 2). The most we've measured is seven below average years out of nine years from 1988 through 1996. Shoreline catch for YOY walleye averaged 99.1 fish per mile in 2016.

In spite of the below average annual abundance estimates observed since 2008, there was no statistically significant long-term CPH trend observed from 1983-2016. Also, we could find no trend in subsets of years that included 2007 through 2016 and 2001 through 2016.

Recent abundance patterns observed in Pool 8 were also apparent in the two other pools sampled for YOY. In 2016, walleye abundance was down in all three pools combined (5, 8 and 10 (Figure 5).

Length frequency distributions for Pool 8 walleye are shown in Figure 3. In 2016, YOY walleye average total length was similar to the long-term mean. Total length of 2016 YOY walleye ranged from 6.0 to 9.3 inches (mean 7.6, N=251). Over the past 34 years, walleye average annual lengths have varied from 6.6 to 8.0 inches (mean = 7.6) (Figure 4). We could find no trend in YOY walleye lengths over all years.

SAUGER

For sauger, the long-term (1983-2016) average CPH, calculated from pooled data, was 82. It has varied from 1.8 fish to 400.1 (Figure 2). In 2016, CPH was 11.5, below the long-term average. Similar to walleye, YOY sauger abundance, as measured by our samples, was below average for eight of the last nine years. Shoreline catch for YOY sauger averaged 12.6 fish per mile.

In spite of the below average annual abundance estimates observed since 2008, there was no statistically significant long-term CPH trend observed from 1983-2016. Also, we could find no trend in a subset of years that included 2007 through 2016. For 2001 through 2016, we did find a declining trend for sauger (P=0.0336). This negative trend was influenced by eight recent below average recruitment years preceded by mostly average or above average years.

Length frequency distributions for Pool 8 sauger are shown in Figure 3. In 2016, YOY sauger average total lengths were similar to the long-term mean. Total length of 2016 YOY sauger ranged from 5.9 to 8.2 inches (mean 6.8, n=32). Over the past 34 years, sauger average annual lengths have varied from 6.0 to 7.3 inches (mean = 6.6) (Figure 4). For YOY sauger there was a significantly declining trend in lengths over all years (P=0.0001). The magnitude of this trend (<0.1 inches) over 34 years appears to be biologically unimportant.

Recent abundance patterns observed in Pool 8 were also apparent in the two other pools sampled for YOY. Similar to Pool 8, YOY sauger catch rates in combined pools were below average in eight of the last nine years (Figure 5). We have not seen this many below average catch rates since initiating these surveys in 1980.

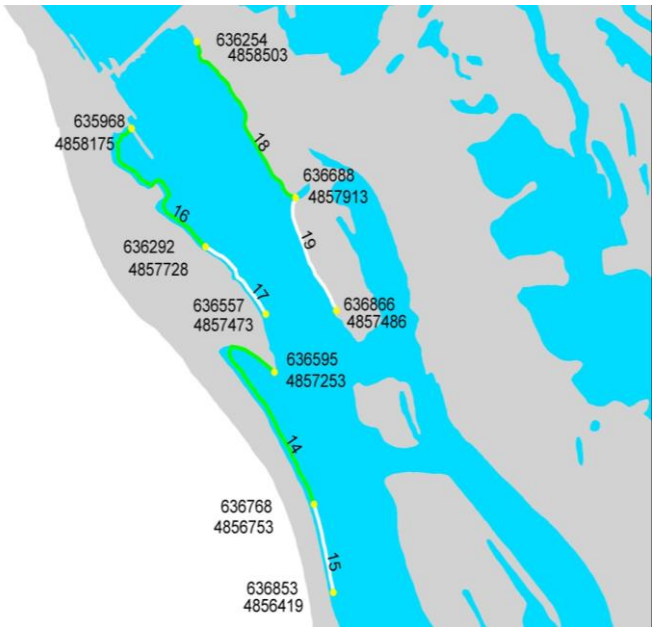
Table 1. Catch per unit effort of walleye and sauger young-of-year (YOY) sampled at six stations in Pool 8 of the Mississippi River in November, 2016.

Station	Walleye YOY/h	Sauger YOY/h	Walleye YOY/mile	Sauger YOY/mile
14	65.7	28.6	71.8	31.2
15	120.0	30.0	115	28.7
16	56.6	3.4	67.1	4.1
17	15.0	0.00	16.0	0.00
18	183.0	3.0	198.1	3.2
19	54.2	5.7	61.2	6.4
AVERAGE	**90.2**	**11.5**	**99.1**	**12.6**

CONCLUSIONS

For eight of the last nine years, Mississippi River YOY abundance estimates for both sauger and walleye were below the long-term average. We could find no long-term trend (1983-2016) in either walleye or sauger abundances in spite of recent declines; although sauger abundance declined during the last 16 years. Also, there were no meaningful trends in average YOY lengths for either species.

Figure 1. Location of Six Routine YOY Walleye and Sauger Electrofishing Runs, with UTM15 NAD83 Coordinates, Located Downstream of Lock and Dam 7, in Pool 8 of the Mississippi River.



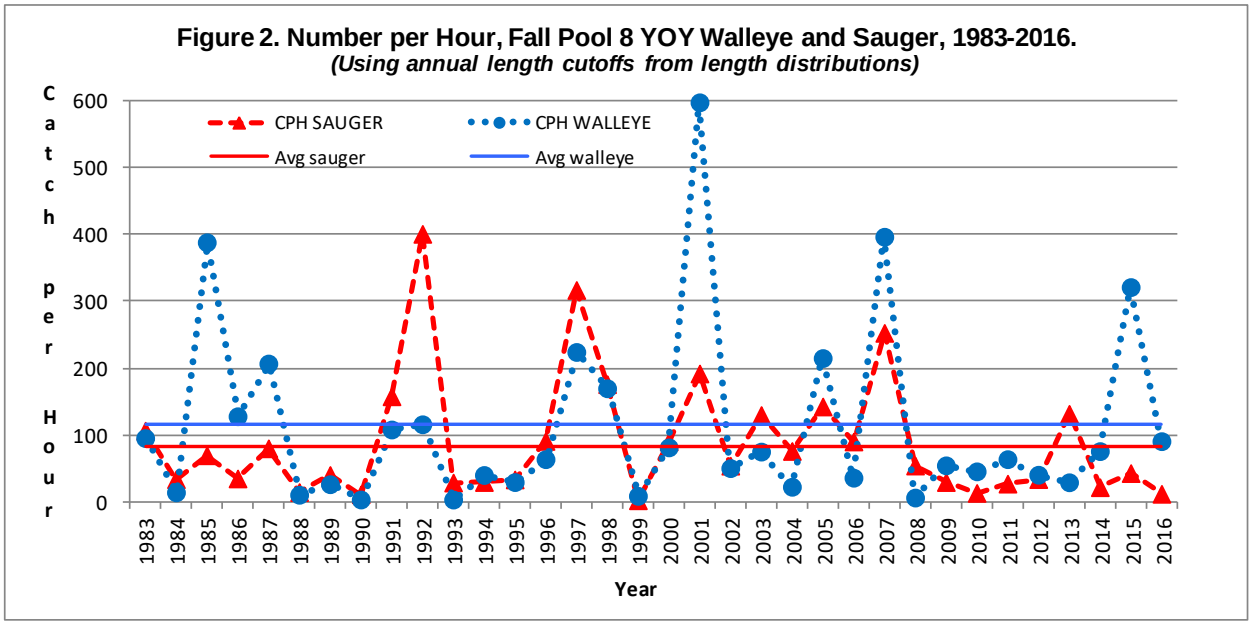


Figure 3. Population Length Frequency Distribution of Young-of-the-Year Walleye and Sauger. Pool 8, Mississippi River, Fall 2016.

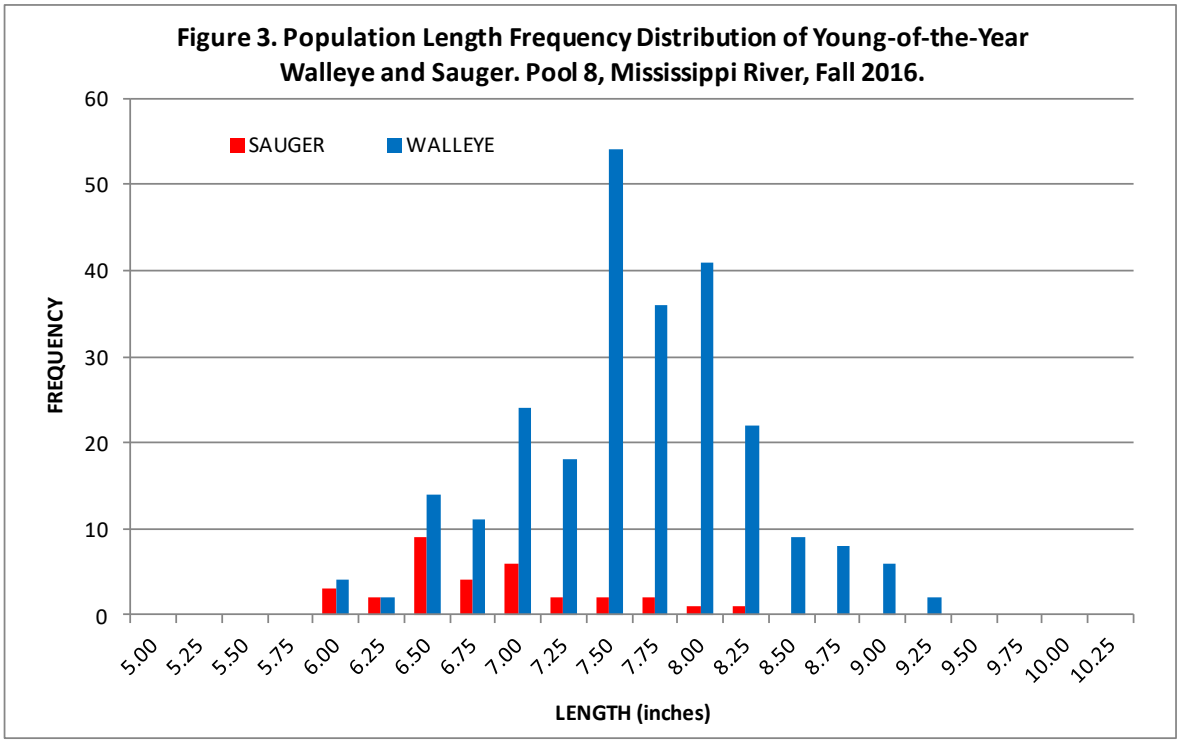


Figure 4. Mean Length in Inches, Fall Pool 8 YOY Walleye and Sauger, 1983-2016. Numbers are sample size. *(Using annual length cutoffs from length distributions)*

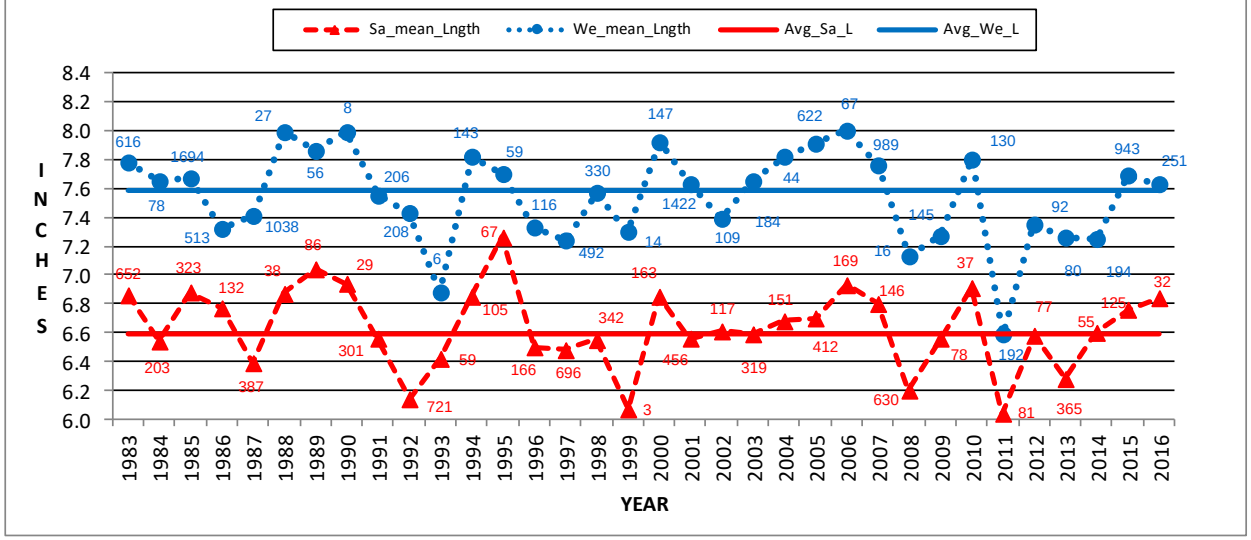
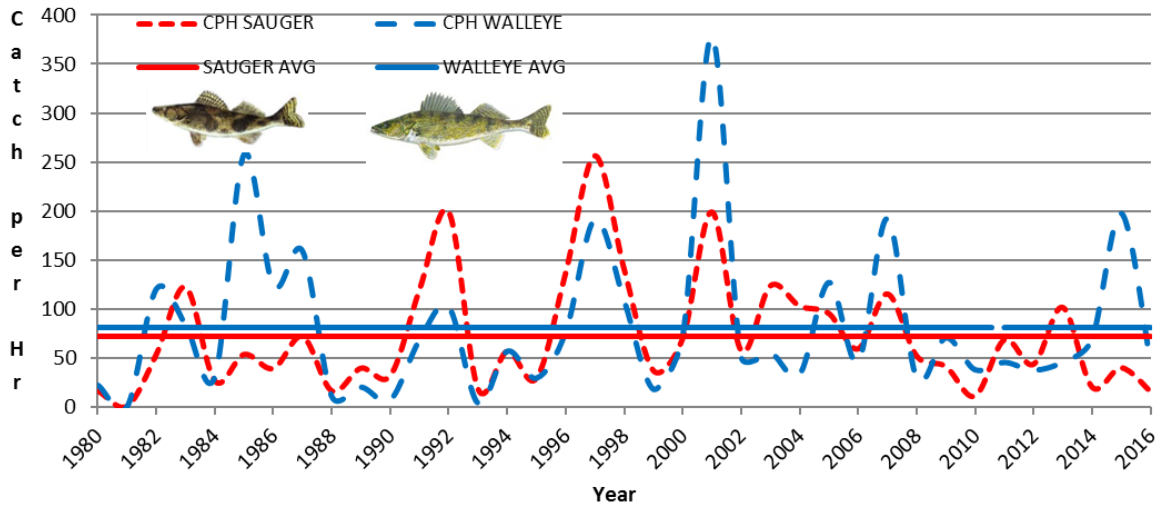


Figure 5. Number per Hour vs Year, Fall Pools 5, 8 & 10 YOY Walleye and Sauger, 1980-2016.
(Using annual length cutoffs from length distributions)



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